PATENT ABSTRACTS OF JAPAN

(11)Publication number : **06-164582**

(43)Date of publication of application : **10.06.1994**

(51)Int.Cl. **H04L 12/24**
H04L 12/26
G06F 13/00

(21)Application number : **04-317622**

(22)Date of filing : **27.11.1992**

(71)Applicant : **NEC CORP**

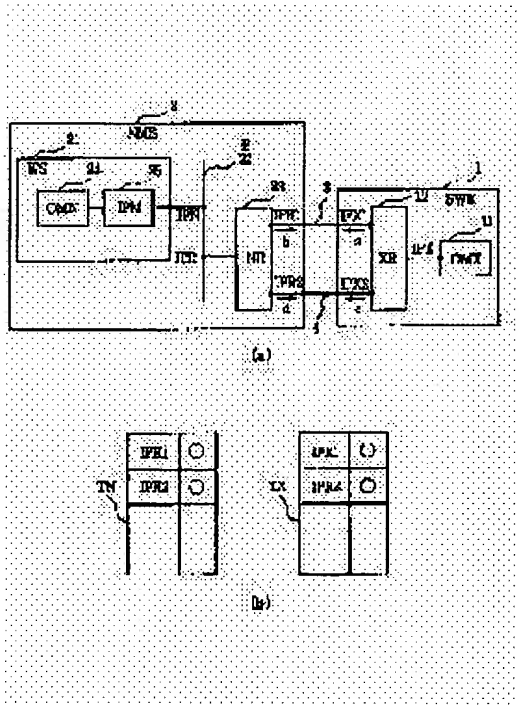
(72)Inventor : **MATSUZAKI MASAAKI**

(54) VIRTUAL ROUTER CONTROLLING SYSTEM

(57)Abstract:

PURPOSE: To execute the transmission and the reception of data between a network management system and a switchboard by setting another line as an alternative route at the time of the fault in one line.

CONSTITUTION: The XR 12 of an SWE 1 informs an OMX 11 of the data for an IPX from the lines 3,4. An NR 23 transmits the data to the SWE 1 by using the normal line from the higher rank of a routing table. When an IPM 25 in a WS 21 receives the data of the SWE 1 for the IPX, it transmits this data to the NR 23 connected by an IPR. The NR 23 transmits the data to the transmitting destination IP address of the received data through an E 22 even though it receives the data from any line of the E 22. The NR 23 and the XR 12 transmit mutually a health check signal periodically to each line 3,4 in order to detect the abnormality of the lines 3,4, and the XR 12 and the NR 23 return their answer signals. The NR 23 and the XR 12 confirm these answer signals, and change the corresponding IP state of the routing table TN or TX.



LEGAL STATUS

[Date of request for examination] 24.12.1996

[Date of sending the examiner's decision of rejection] 13.06.2000

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] It is the virtual router control system which gives the IP address for routers for every circuit of said in a switching system equipped with the exchange connected with the router which a network-control system has by the TCP/IP protocol by two or more circuits while giving the IP address corresponding to the exchange corresponding to said body of the exchange to said exchange, and is characterized by for said exchange to make the signal of said IP address going corresponding to the exchange via said router ability ready for receiving from said every circuit corresponding to said IP address for routers.
[Claim 2] Said exchange is a virtual router control system according to claim 1 characterized by using said circuits other than said failure circuit when it has the virtual router which detects a failure circuit with a router protocol between said router and said IP address for routers and a signal is transmitted to said network-control system from said exchange.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the virtual router control system in the switching system connected with the exchange by the TCP/IP protocol (transmission control protocol/internetprotocol) by the circuit via a router in a network-control system.
[0002]
[Description of the Prior Art] When controlling the exchange from a network-control system in this kind of switching system conventionally, the only TCP/IP address was given to the one exchange and it had connected with the network-control system.
[0003]
[Problem(s) to be Solved by the Invention] In this conventional exchange system, when the circuit between a network-control system and the exchange became a failure, there was a trouble of it becoming impossible to control this exchange.
[0004] The purpose of this invention is for the exchange to offer the router control system can receive the signal of IP address going corresponding to the exchange via the router of a network-control system from every circuit corresponding to the IP address for routers, and it enabled it to transmit by the alternative route from a network-control system at the time of a line failure.
[0005]
[Means for Solving the Problem] In a switching system equipped with the exchange connected with the router with which a network-control system has the virtual router control system of this invention by the TCP/IP protocol by two or more circuits While giving the IP address corresponding to the exchange corresponding to said body of the exchange to said exchange, the IP address for routers is given for said every circuit. It is characterized by said exchange making the signal of said IP address going corresponding to the exchange via said router ability ready for receiving from said every circuit corresponding to said IP address for routers.
[0006] And it is characterized by said exchange using said circuits other than said failure circuit, when it has the virtual router which detects a failure circuit with a router protocol between said router and said IP address for routers and a signal is transmitted to said network-control system from said exchange.
[0007]
[Example] Next, this invention is explained with reference to a drawing. Drawing 1 - drawing 5 are drawings for explaining the actuation in the virtual router control system of this invention, and are drawing showing the example of contents of the routing tables [in / (a) and / in (b) / each drawing (a)] TN and TX. [the block diagram of a switching system]
[0008] As shown in ** (a) of drawing 1 - drawing 5 , the switching system of this example consists of the exchange (henceforth, SWE) 1 and the network-control system (henceforth, NMS) 2 which were connected by circuits 3 and 4.
[0009] SWE1 is equipped with the virtual router (henceforth, XR) 12 to which router circuit IP addresses IPX1 and IPX2 were given, and the maintenance employment section (henceforth, OMX) 11

to which the OMXIP address IPX was given.
[0010] Moreover, NMS2 is equipped with the workstation (henceforth, WS) 21 which has the maintenance employment section [less or equal OMN24 and IP protocol control section (henceforth, IPM) 25, and a router (henceforth, NR) 23, and, as for NR23, ****** router circuit IP addresses IPR1 and IPR2 are given to router circuit IP addresses IPX1 and IPX2 of XR12. And WS21 and NR23 are connected by the WSIP address IPN and NMS router IP address IPR of ISANETTO (henceforth, E) 22, respectively.
[0011] Furthermore, NR23 and XR12 have the routing tables TN and TX, respectively, and as shown in each drawing (b), the normality and selection ranking of a router circuit IP address corresponding to circuits 3 and 4 are shown in these routing tables TN and TX.
[0012] In SWE1 shown in each drawing (a), even if XR12 of SWE1 receives data from any of circuits 3 and 4, it notifies the data for the OMXIP addresses IPX to OMX11. NR23 will transmit to SWE1 from the high order of a routing table using a normal circuit, if the data for the OMXIP addresses IPX are received from E22.
[0013] IPM25 in WS21 will transmit this data to NR23 connected by NMS router IP address IPR, if the data for the OMXIP addresses IPX of SWE1 are received. Even if NR23 receives data from the circuit of E22 throat, it transmits to the transmission place IP address of received data by E22 course.
[0014] In order that NR23 and XR12 may detect the abnormalities of circuits 3 and 4 mutually, a health check signal is periodically transmitted to each circuits 3 and 4, and if a health check signal is received, XR12 and NR23 of a receiving side will return the reply signal. And NR23 and XR12 of a transmitting side check this reply signal, and they change the routing table TN or applicable IP condition of TX.
[0015] Next, actuation of this example is explained.
[0016] As for drawing 1 (a), XR12 shows the case where delivery and NR23 return reply signals b and d for the health check signals a and c to NR23, through circuits 3 and 4, respectively. In this case, since reply signals b and d are in both the circuits 3 and 4 on the contrary normally, the condition on the routing table TX becomes normal"O" also with both routers circuit IP addresses IPR1 and IPR2, as shown in drawing 1 (b).
[0017] As for drawing 2 (a), NR23 shows the case where delivery and XR12 return reply signals f and h for the health check signals e and g, through circuits 3 and 4 to XR12, respectively. Since reply signals f and h are in both the circuits 3 and 4 on the contrary normally also in this case, the condition on the routing table TN becomes normal"O" also with both routers circuit IP addresses IPX1 and IPX2, as shown in drawing 2 (b).
[0018] Drawing 3 shows the case where the data i for the OMXIP addresses IPX are transmitted to SWE1 from OMN24 of WS21 in the condition which shows in drawing 1 . OMN24 transmits Data i for Data i to IPM25 by 25Edelivery and IPM22 course NR23. NR23 which received Data i transmits Data i to SWE1 using the circuit 3 corresponding to the OMXIP address IPX according to the routing table TN. Since a transmission place IP address is the OMXIP address IPX, XR12 which received Data i passes received-data i to OMX11.
[0019] Next, actuation when a circuit 3 becomes a failure (x mark shows) is explained.
[0020] To SWE1, drawing 4 shows the case where drawing 5 sends data to NMS2 from SWE1, from NMS2, respectively. When the reply signal to the health check signal indicated to be also drawing 4 and drawing 5 by drawing 1 and drawing 2 does not come on the contrary, the routing table TN corresponding to a circuit 3 and router circuit IP addresses IPX1 and IPR1 on TX are in the condition in a failure "x" as [show / in drawing 4 (b) and drawing 5 (b)].
[0021] First, in drawing 4 , since router circuit IP address IPX1 of the routing table TN is among a failure, the data i which came to NR23 transmit Data i to SWE1 using the circuit 4 corresponding to router circuit IP address IPX2. That is, a circuit 4 serves as an alternative route. Since the IP address of a transmission place is the OMXIP address IPX even when Data i are received from a circuit 4, XR12 passes Data i to OMX11.
[0022] Next, in drawing 5 , when OMX11 sends Data j to OMN24 of WS21, XR12 will transmit Data j to NMS2 using the circuit 4 corresponding to router circuit IP address IPR2 according to the routing

table TX, if Data j are received from OMX11. NR23 which received Data j transmits Data j to the WSIP address IPN of a transmission place by E22 course. IPM25 passes the received data j to OMN24.
[0023] Thus, in this example, data can be transmitted [by making the circuit of another side into an alternative route] at the time of the failure of one circuit and received by forming the virtual router XR12 in SWE1, and linking directly by the router NR23 by the side of NMS2, and two circuits 3 and 4.
[0024]
[Effect of the Invention] As explained above, this invention has the effectiveness that one circuit can set other circuits as an alternative route at the time of a failure, and can transmit and receive data between a network-control system and the exchange, by forming a virtual router in the exchange and linking directly by the router in a network-control system, and two or more circuits.
[0025] Moreover, since a setup of an alternative route is performed on router level, the application of a high order has the effectiveness that he does not need to be conscious of a circuit condition.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the virtual router control system in the switching system connected with the exchange by the TCP/IP protocol (transmission control protocol/internetprotocol) by the circuit via a router in a network-control system.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] When controlling the exchange from a network-control system in this kind of switching system conventionally, the only TCP/IP address was given to the one exchange and it had connected with the network-control system.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, this invention has the effectiveness that one circuit can set other circuits as an alternative route at the time of a failure, and can transmit and receive data between a network-control system and the exchange, by forming a virtual router in the exchange and linking directly by the router in a network-control system, and two or more circuits.
[0025] Moreover, since a setup of an alternative route is performed on router level, the application of a high order has the effectiveness that he does not need to be conscious of a circuit condition.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In this conventional exchange system, when the circuit between a network-control system and the exchange became a failure, there was a trouble of it becoming impossible to control this exchange.
[0004] The purpose of this invention is for the exchange to offer the router control system can receive the signal of IP address going corresponding to the exchange via the router of a network-control system from every circuit corresponding to the IP address for routers, and it enabled it to transmit by the alternative route from a network-control system at the time of a line failure.

[Translation done.]

* NOTICES *

MEANS

[Means for Solving the Problem] In a switching system equipped with the exchange connected with the router with which a network-control system has the virtual router control system of this invention by the TCP/IP protocol by two or more circuits While giving the IP address corresponding to the exchange corresponding to said body of the exchange to said exchange, the IP address for routers is given for said every circuit. It is characterized by said exchange making the signal of said IP address going corresponding to the exchange via said router ability ready for receiving from said every circuit corresponding to said IP address for routers.
[0006] And it is characterized by said exchange using said circuits other than said failure circuit, when it has the virtual router which detects a failure circuit with a router protocol between said router and said IP address for routers and a signal is transmitted to said network-control system from said exchange.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EXAMPLE

[Example] Next, this invention is explained with reference to a drawing. Drawing 1 - drawing 5 are drawings for explaining the actuation in the virtual router control system of this invention, and are drawing showing the example of contents of the routing tables [in / (a) and / in (b) / each drawing (a)] TN and TX. [the block diagram of a switching system]
[0008] As shown in ** (a) of drawing 1 - drawing 5 , the switching system of this example consists of the exchange (henceforth, SWE) 1 and the network-control system (henceforth, NMS) 2 which were connected by circuits 3 and 4.
[0009] SWE1 is equipped with the virtual router (henceforth, XR) 12 to which router circuit IP addresses IPX1 and IPX2 were given, and the maintenance employment section (henceforth, OMX) 11 to which the OMXIP address IPX was given.
[0010] Moreover, NMS2 is equipped with the workstation (henceforth, WS) 21 which has the maintenance employment section [less or equal OMN24 and IP protocol control section (henceforth, IPM) 25, and a router (henceforth, NR) 23, and, as for NR23, ****** router circuit IP addresses IPR1 and IPR2 are given to router circuit IP addresses IPX1 and IPX2 of XR12. And WS21 and NR23 are connected by the WSIP address IPN and NMS router IP address IPR of ISANETTO (henceforth, E) 22, respectively.
[0011] Furthermore, NR23 and XR12 have the routing tables TN and TX, respectively, and as shown in each drawing (b), the normality and selection ranking of a router circuit IP address corresponding to circuits 3 and 4 are shown in these routing tables TN and TX.
[0012] In SWE1 shown in each drawing (a), even if XR12 of SWE1 receives data from any of circuits 3 and 4, it notifies the data for the OMXIP addresses IPX to OMX11. NR23 will transmit to SWE1 from the high order of a routing table using a normal circuit, if the data for the OMXIP addresses IPX are received from E22.
[0013] IPM25 in WS21 will transmit this data to NR23 connected by NMS router IP address IPR, if the data for the OMXIP addresses IPX of SWE1 are received. Even if NR23 receives data from the circuit of E22 throat, it transmits to the transmission place IP address of received data by E22 course.
[0014] In order that NR23 and XR12 may detect the abnormalities of circuits 3 and 4 mutually, a health check signal is periodically transmitted to each circuits 3 and 4, and if a health check signal is received, XR12 and NR23 of a receiving side will return the reply signal. And NR23 and XR12 of a transmitting side check this reply signal, and they change the routing table TN or applicable IP condition of TX.
[0015] Next, actuation of this example is explained.
[0016] As for drawing 1 (a), XR12 shows the case where delivery and NR23 return reply signals b and d for the health check signals a and c to NR23, through circuits 3 and 4, respectively. In this case, since reply signals b and d are in both the circuits 3 and 4 on the contrary normally, the condition on the routing table TX becomes normal"O" also with both routers circuit IP addresses IPR1 and IPR2, as shown in drawing 1 (b).
[0017] As for drawing 2 (a), NR23 shows the case where delivery and XR12 return reply signals f and h for the health check signals e and g, through circuits 3 and 4 to XR12, respectively. Since reply signals f

and h are in both the circuits 3 and 4 on the contrary normally also in this case, the condition on the routing table TN becomes normal"O" also with both routers circuit IP addresses IPX1 and IPX2, as shown in drawing 2 (b).
[0018] Drawing 3 shows the case where the data i for the OMXIP addresses IPX are transmitted to SWE1 from OMN24 of WS21 in the condition which shows in drawing 1 . OMN24 transmits Data i for Data i to IPM25 by 25Edelivery and IPM22 course NR23. NR23 which received Data i transmits Data i to SWE1 using the circuit 3 corresponding to the OMXIP address IPX according to the routing table TN. Since a transmission place IP address is the OMXIP address IPX, XR12 which received Data i passes received-data i to OMX11.
[0019] Next, actuation when a circuit 3 becomes a failure (x mark shows) is explained.
[0020] To SWE1, drawing 4 shows the case where drawing 5 sends data to NMS2 from SWE1, from NMS2, respectively. When the reply signal to the health check signal indicated to be also drawing 4 and drawing 5 by drawing 1 and drawing 2 does not come on the contrary, the routing table TN corresponding to a circuit 3 and router circuit IP addresses IPX1 and IPR1 on TX are in the condition in a failure "x" as [show / in drawing 4 (b) and drawing 5 (b)].
[0021] First, in drawing 4 , since router circuit IP address IPX1 of the routing table TN is among a failure, the data i which came to NR23 transmit Data i to SWE1 using the circuit 4 corresponding to router circuit IP address IPX2. That is, a circuit 4 serves as an alternative route. Since the IP address of a transmission place is the OMXIP address IPX even when Data i are received from a circuit 4, XR12 passes Data i to OMX11.
[0022] Next, in drawing 5 , when OMX11 sends Data j to OMN24 of WS21, XR12 will transmit Data j to NMS2 using the circuit 4 corresponding to router circuit IP address IPR2 according to the routing table TX, if Data j are received from OMX11. NR23 which received Data j transmits Data j to the WSIP address IPN of a transmission place by E22 course. IPM25 passes the received data j to OMN24.
[0023] Thus, in this example, data can be transmitted [by making the circuit of another side into an alternative route] at the time of the failure of one circuit and received by forming the virtual router XR12 in SWE1, and linking directly by the router NR23 by the side of NMS2, and two circuits 3 and 4.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing for explaining the actuation in the virtual router control system of this invention, and is drawing showing the example of contents of the routing tables [in / (a) and / in (b) / this drawing (a)] TN and TX. [the block diagram of a switching system]
[Drawing 2] It is drawing for explaining the actuation in the virtual router control system of this invention, and is drawing showing the example of contents of the routing tables [in / (a) and / in (b) / this drawing (a)] TN and TX. [the block diagram of a switching system]
[Drawing 3] It is drawing for explaining the actuation in the virtual router control system of this invention, and is drawing showing the example of contents of the routing tables [in / (a) and / in (b) / this drawing (a)] TN and TX. [the block diagram of a switching system]
[Drawing 4] It is drawing for explaining the actuation in the virtual router control system of this invention, and is drawing showing the example of contents of the routing tables [in / (a) and / in (b) / this drawing (a)] TN and TX. [the block diagram of a switching system]
[Drawing 5] It is drawing for explaining the actuation in the virtual router control system of this invention, and is drawing showing the example of contents of the routing tables [in / (a) and / in (b) / this drawing (a)] TN and TX. [the block diagram of a switching system]
[Description of Notations]
1 Exchange (SWE)
2 Network-Control System (NMS)
3 Four Circuit
11 24 Maintenance employment section (OMX, OMN)
12 Virtual Router (XR)
21 Workstation (WS)
22 ISANETTO (E)
23 Router (NR)
25 IP Protocol Control Section (IPM)
IPN WSIP address
IPR NMS router IP address
IPR1, IPR2, IPX1, IPX2 Router circuit IP address
IPX OMXIP address
TN, TX Routing table
a, c, e, g Health check signal
b, d, f, h Reply signal
i Data for SWE(s) from NMS
j Data for NMS from SWE

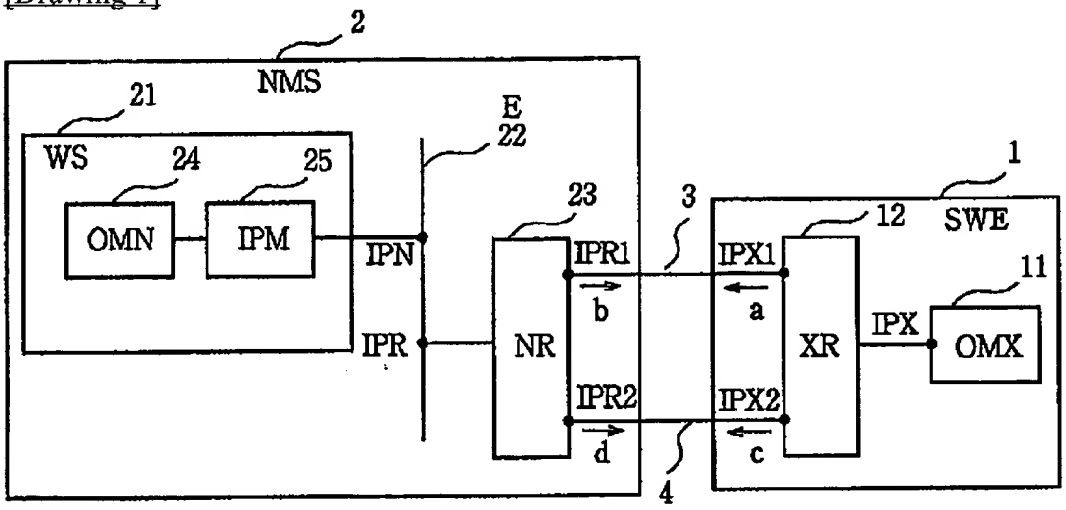
[Translation done.]

* NOTICES *

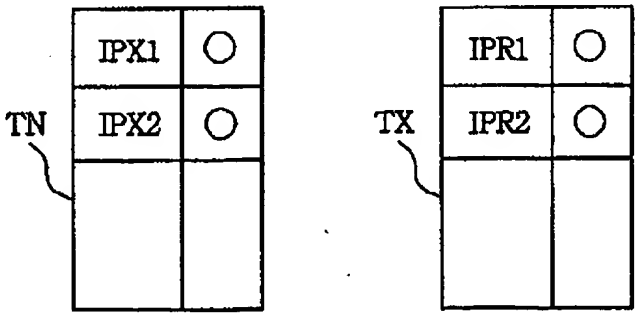
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

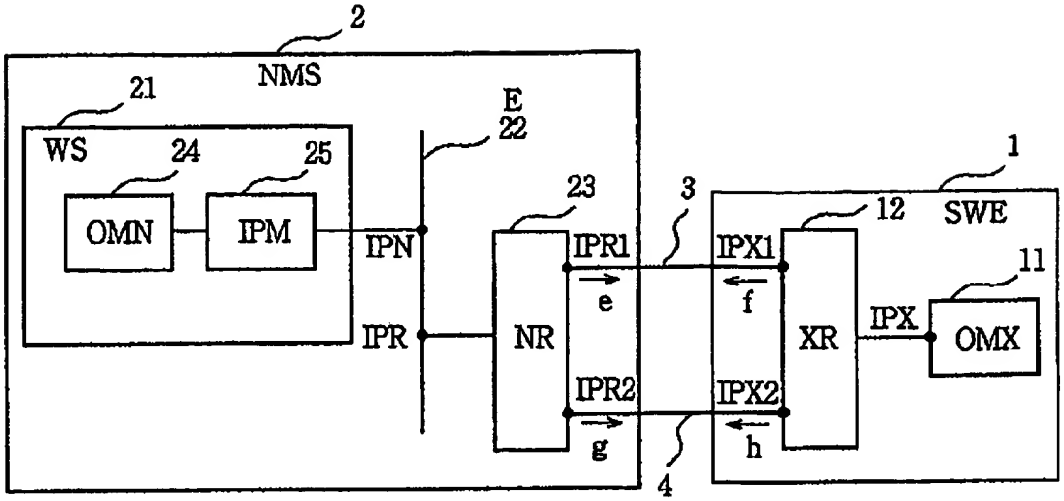


(a)

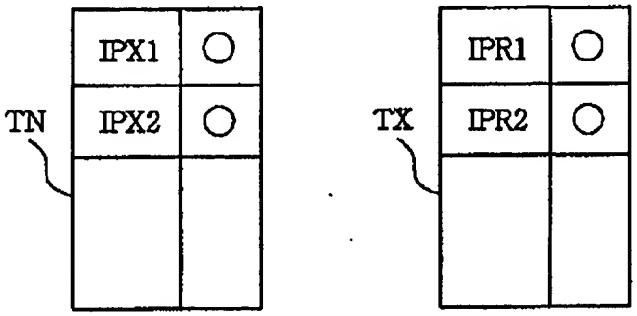


(b)

[Drawing 2]

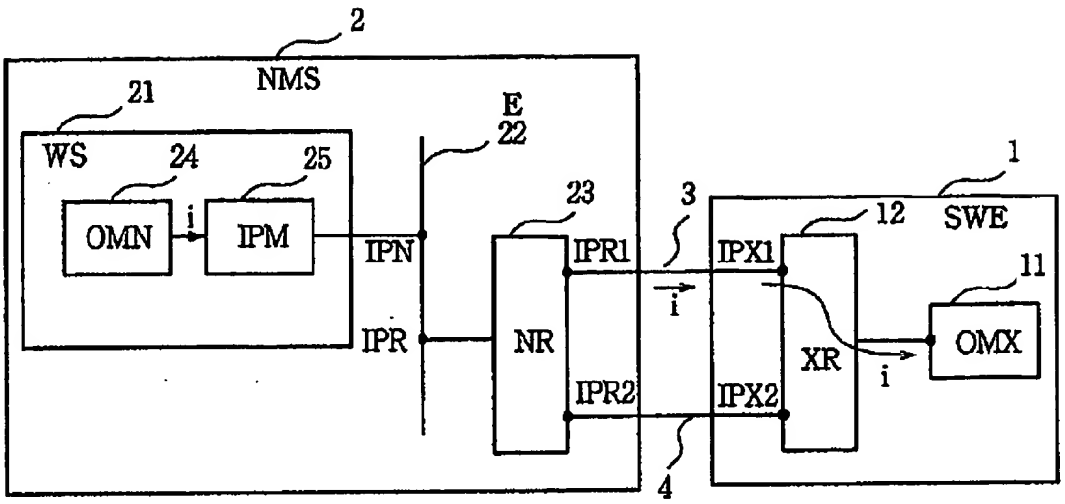

2
NMS
21
WS
24
OMN
25
IPM
E
22
IPN
IPR
23
NR
IPR1
IPR2
e
g
3
4
1
SWE
12
IPX1
IPX2
f
h
XR
IPX
11
OMX

(a)

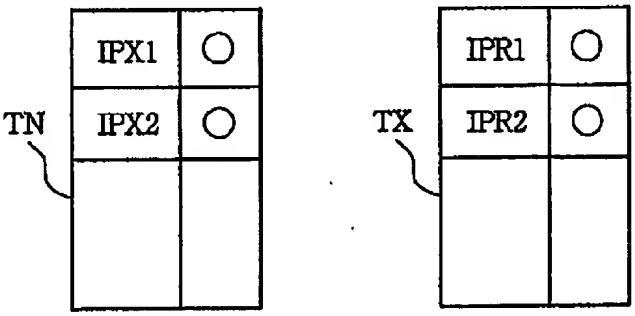

TN
IPX1
IPX2
TX
IPR1
IPR2

(b)

[Drawing 3]

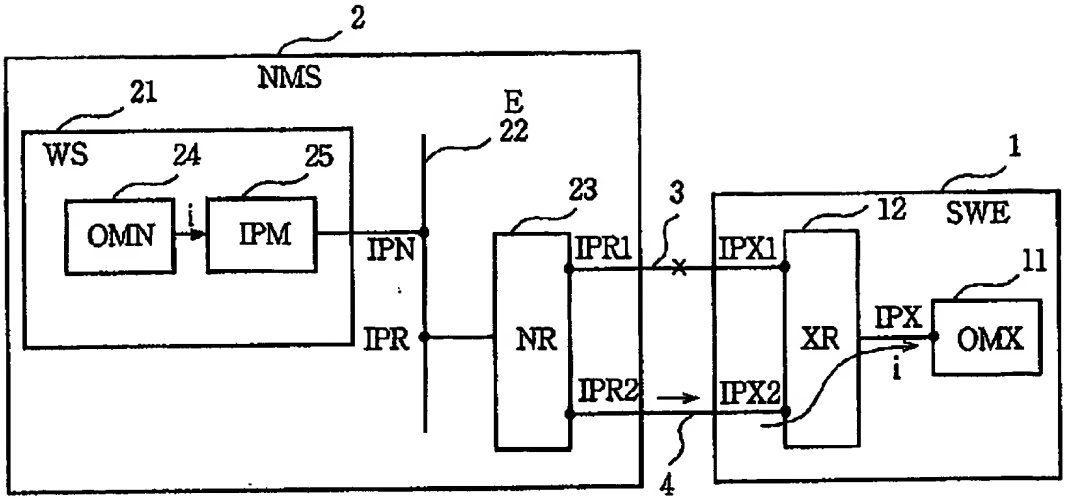

2
NMS
21
WS
24
25
OMN
i
IPM
E
22
IPN
IPR
23
NR
IPR1
IPR2
3
i
4
1
SWE
12
IPX1
IPX2
XR
i
11
OMX

(a)

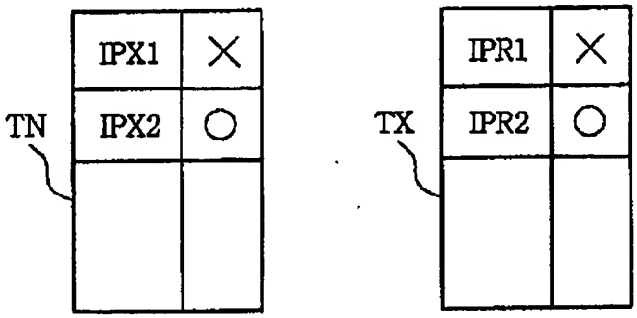

TN
IPX1
IPX2
TX
IPR1
IPR2

(b)

[Drawing 4]

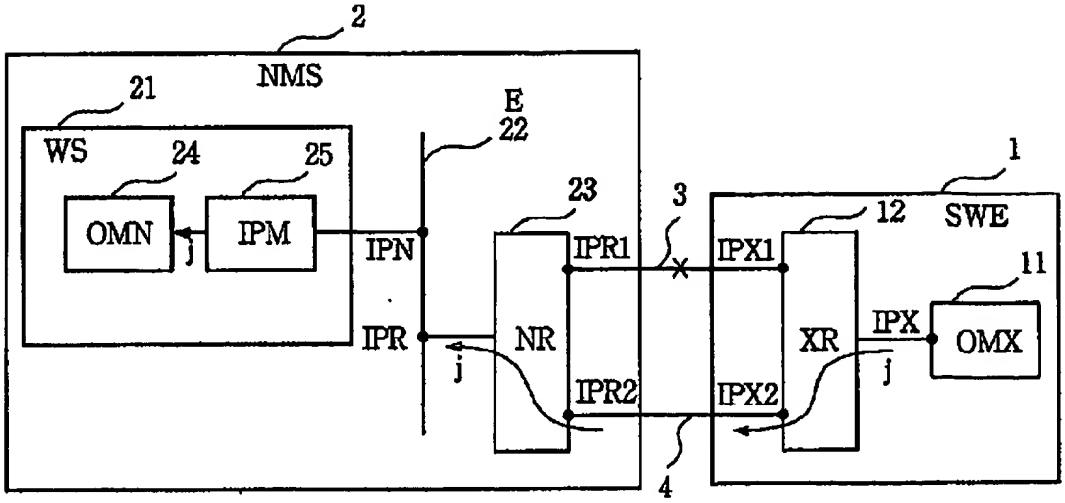

2
NMS
21
WS
24
25
OMN
i
IPM
E
22
IPN
IPR
23
NR
IPR1
IPR2
3
4
1
SWE
12
IPX1
IPX2
XR
IPX
i
11
OMX

(a)

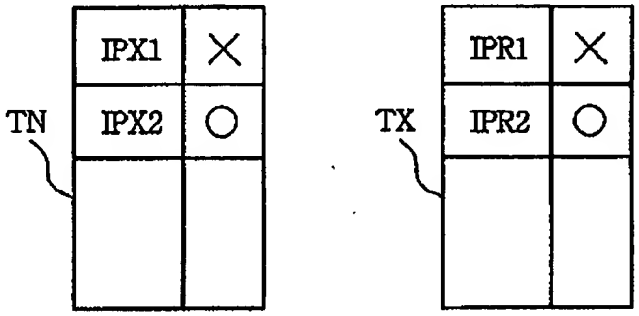

TN
IPX1
×
IPX2
○
TX
IPR1
×
IPR2
○

(b)

[Drawing 5]



(a)



(b)

[Translation done.]